

ENCLOSURE

Technical Analysis of New Method for Use of Perchloroethylene in Dry Cleaning

1. "On June 25, 1953 Mr. [redacted] and the writer visited Dr R Hess, director of research and development, Chemische Fabrik Stockhausen and Cie, Krefeld, Germany to discuss their recent development in dry cleaning soaps. Perchloroethylene is used very widely in Germany as a dry cleaning solvent. Wacker is a large producer of perchloroethylene which they sell under the trade name, 'Perawin', and they also manufacture the dry cleaning machine. Stockhausen is the oldest and one of the leading suppliers of dry cleaning soaps, having been in the field for 40 years.
2. "Twenty years ago only enough water was used in perchloroethylene to permit saponification of dissolved fats from the dry cleaning operation. When the new development of using filters was instituted, the problem of plugging of the filter arose, and with the new machines that operate so rapidly the plugging of the filter is even more acute. Stockhausen was faced with the problem of developing a soap and cleaning process which would not plug the filter and which filtered rapidly. The use of such alkaline materials as ammonia, sodium carbonate and sodium phosphate has long been known to give good cleaning in perchloroethylene, but they are corrosive to the galvanized steel equipment used in German dry cleaning machines.
3. "Stockhausen developed a series of soaps but the one which most ideally solves the above problem is 'Frapantol 7388', which is produced from a hexasodium triphosphosphate called 'Polyron' (purchased from the Albert Co in Germany). Ordinary sodium metaphosphate, such as Calgon, cannot be used because it is easily hydrolyzed, whereas the 'Frapantol 7388' is very resistant to hydrolysis. As purchased from the Albert Co the hexasodium triphosphosphate is not soluble in perchloroethylene but Stockhausen has developed a method of 'solubilizing' it so that a very fine colloidal suspension of the phosphate in perchloroethylene can be obtained. This method of 'solubilization' is evidently the secret of their process.
4. "With 'Frapantol 7388' cleaning is so improved that wet spotting is unnecessary. This is important for in certain parts of Germany as much as 50% of the cleaned clothes must be wet spotted. This product has been sold in Germany for the last six months with very good acceptance, despite the fact that Stockhausen gives no guarantee to the dry cleaners on the effect it will have on their equipment. Most German machines are made of galvanized steel which is attacked by the 'Frapantol 7388', and it is necessary to use a V4A stainless steel wheel. Some German cleaners with copper equipment (other than the wheel) use 'Frapantol 7388', and some corrosion is encountered in the still. By using a stainless steel still this corrosion should be eliminated. Dr Hess has recommended to Wacker that all parts of the machine (except the wheel) be tin plated to avoid this corrosion.
5. "'Frapantol 7388' has a pH of 9.5, and it contains about 30% water. The dry cleaner uses 1-2 grams of this soap per liter of perchloroethylene i.e. only 0.1% of soap is added. It is not necessary to rinse the clothes with pure perchloroethylene until the fatty acids have built up to ca 3%. The used perchloroethylene mixture is recycled until it becomes dirty, after which it is distilled; in some German machines continuous distillation is employed. The total time required from loading the clothes into the machine to removing them at the end is 25 minutes. The washing step requires 10 minutes.
6. "Note that no water is used with 'Frapantol 7388'. Dr Hess said that in 1950-1951 the Germans added water in dry cleaning processes because of the US influence. The Germans found that water caused the clothes to lose their shape, shrink, etc and they have since discontinued any extra water addition.
7. "Frapantol 7388 is sold in Germany at 2.35 DM/kg or \$0.26/lb. This is considerably cheaper than the dry cleaning soaps sold in America and much less is required.

~~CONFIDENTIAL/NO OFFICIALS COPY - SECURITY INFORMATION~~

- 2 -

8. "Other dry cleaning soaps, as described below, have been developed by Stockhausen recently, but Dr Hess stressed that 'Frapantol 7388' is the best. The other soaps are:

- (a) 'Benzapone' - a non-ionic whose cleaning action lies between that of alkaline cleaning processes, such as 'Frapantol 7388', and commercial soaps. Dr Hess stated that a mixed product of anionic and non-ionic detergents is also used by some customers. He pointed out that cationic soaps cannot be used, probably for the same reason as was given us by the National Institute of Drycleaning, namely, that cationics are more actively absorbed by the fabrics.
- (b) 'Benzapone 7427' is a very new, non-ionic detergent designed specifically for perchloroethylene. To reduce foaming in the still to a minimum, Dr Hess said that non-ionic detergents, such as 'Benzapone 7427' should be used. It is a mixture of 30% of non-ionic detergent and 70% of solvent. Note that no water is present and none is normally added although it can be. This soap attacks none of the metals, and the pressure is not increased in filter, indicating rapid filtering, but its cleaning power is not outstanding, although still satisfactory. It sells at \$0.32/lb and is used at the same concentration as 'Frapantol 7388' (0.1%).
- (c) 'Frapantol B' is an alkali-free soap with a neutral pH. Its composition was not disclosed. Frapantol B has the best water carrying capacity of all Stockhausen soaps. Ten parts of Frapantol B (which contains 30% water as purchased) can dissolve 4 parts of additional water, or a total of 50% Frapantol B is better than most soaps but not as efficient as Frapantol 7388. Dr Hess stressed the fact that since good cleaning is obtained with Frapantol B it is good evidence that a base is not necessary for good cleaning. Frapantol B is used at 0.1% conc and will not corrode the equipment. Its price is \$0.28 lb."

-and-